Solving Your 5 Toughest Design Challenges in a Motion Control System

Simple Step®
Motion Control Made Simple!®

Intro

In many cases, motion control design is not as simple or as reliable as it should be. It's an industry sometimes plagued with high failure rates and space problems (i.e. the board won't fit). Then after you get it installed, you find out there is a steep learning curve or a lack of support.

This white paper shares the stories of 5 companies that faced challenges with motion control and how they came out ahead in the end.

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Crash and burn

Edhard in Hackettstown, NJ creates equipment for the bakery, food service, cosmetic, and packaging industries. They make filler units, power bases, cake decorators, and accessories.

Several years ago, Edhard had some quality control problems with their vendor's motion controllers which were affecting the company's ability to break into the European market. The units they were testing all too often would blow up and catch fire.

Some boards arrived DOA, other boards just wouldn't work right. Out of 100 units, maybe 20 actually did something. This translated into an abysmal 80% failure rate.

Something had to be done. With this failure rate, the company would not be able to enter the European market. They needed to find a company whose motion controls were more reliable and would complement their custom design. They would need specific keyboard placement and mounting. Was there a company that could solve these issues?

Fortunately, one of Edhard's other suppliers had recommended Simple Step. He had worked with Simple Step before and thought the motion control company could help. A meet and greet was arranged.

THE CLIENT

Edhard is an equipment manufacturer in Hackettstown, NJ that makes dosing systems for bakery, food service, cosmetic, and packaging companies.

THE PROBLEM

The motion control boards from their existing vendor had an abysmal 80% failure rate. And they ran so hot they often had system failures during testing and running in the field.

Crash and burn

It didn't take long for the president of Simple Step, Charles Grenz, to size up the problem, dream up the solution, and formulate the plan. Charles redesigned the motion control system with all new ARM controls specifically for an Edhard machine. With the Simple Step redesign, their machine was not only reliable but it ran 100 degrees cooler.

Everything Simple Step sent worked right out of the box.

When Edhard tested the new system, the new controller produced 4X the torque and ran 5X the speed. It was also the same size. They just plugged it in and didn't have to make any changes.

With the unpredictability removed and the general performance improved, Edhard confidently entered the European market with a machine that passes all testing and is CE compliant.

THE SOLUTION

A new custom board design from Simple Step ran 100 degrees cooler with far better reliability. It had a .0000436 failure rate and produced 4X the torque and 5X the speed, with software that was easier to use and offered many more options.

THE RESULTS

The new system passed all testing and enabled Edhard to open up the European market.

Edhard Corp. has built a reputation of quality, reliability and dependable service since 1972. When we were referred to Charles and Simple Step, the control boards in our variable speed power base were failing at an alarming rate. Simply put, we were at wits' end. Customers were beginning to question whether or not they could rely on our equipment anymore. Quite honestly, we had never been in this position but soon after Charles provided us with our first prototype, we could see that we had begun a relationship with a true professional. Simple Step helped resurrect the product line that had slipped and our customers' faith in our equipment had been restored.

Aivars BÄrs, President at Edhard Corp.

Assembling bits and pieces from numerous vendors

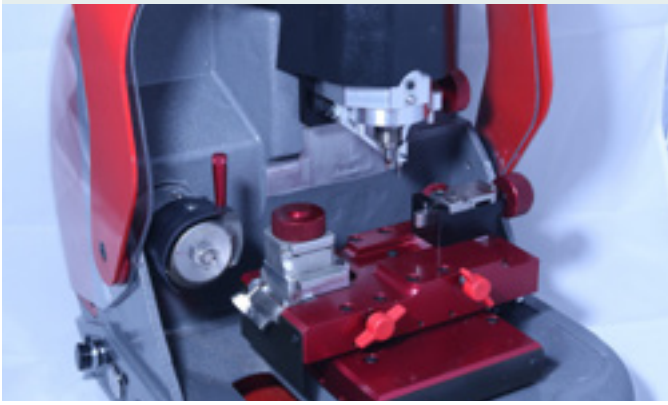
Laser Key Products in Bacliff, TX manufactures high-end key machines and other tools for locksmiths. Their latest product, the 3D Pro Xtreme is a fully automatic high-security key machine.

A few years ago, Laser Key wanted to design a transportable automated key cutting machine that could produce high quality keys, reliably, in a multitude of environments and weather conditions. Their design not only required a superior motion control system but also called for a comprehensive system that didn't involve Laser Key buying external components to use with the board. If the machine was going to be transportable, it would have to be compact and reliable. This small footprint couldn't be weighed down with bulky external components that needed to be added. Besides, there just wasn't any more room inside the system for the added external components. The difficulty was in finding a company that would have the external components already incorporated into the controller.

When Laser Key approached Simple Step, Charles devised a way to get it done. He took a standard Simple Step control board and integrated it into the key machine. No need

THE CLIENT

Laser Key is a high-end key machine manufacturer in Bacliff, TX that makes a fully automatic high-security key machine.



THE PROBLEM

The motion-control boards from most vendors required them to assemble several pieces for which they had no room.

Assembling bits and pieces from numerous vendors

for external components such as translators, amplifiers/drivers, encoder sensors for feedback or multi-output power supplies. With this new control board, it is all plug & play. Connect a USB cable, plug in power, connect the motors. Then run it. That's it.

The Simple Step controller gave Laser Key an edge they could use. Never again did their design have to be sacrificed in order to accommodate bulky external components. No more wasting time, energy and money searching multiple vendors for components. No more high incidence of failure due to cabling and external modules. The machine with its new all-inclusive motion controller went into production. Their cutting-edge portable key cutting machine is well received, and demand for a compact and transportable key machine is high among locksmiths, government agencies, and other companies.

THE SOLUTION
An all inclusive board designed by Simple Step that could be dropped in and fit in the small amount of space available.

THE RESULTS
Their machine is selling so well they are busy keeping up with the orders.

Simple Step and Charles Grenz have supported and educated us from the beginning of Laser Key Products, providing us with the perfect solution for our motion controller needs. Without the knowledge, expertise and enthusiasm offered over the years, our company would have been unable to flourish as we have. We highly recommend Simple Step and their products for any project in need of accurate and precise motion control systems.

Darrel Howard, President of Laser Key Products

Mounting problems

VJ Electronix, a subdivision of the **VJ Group** in Bohemia, NY manufactures a rework machine that uses motion control to desolder and resolder surface mounted electronic components.

The high precision machine uses x-ray to locate a certain component in a 3D environment and either refinishes or replaces the component on printed circuit boards. VJ experienced a frustrating situation. The systems from motion control vendors were tough to fit into the rework machine chassis. The systems were difficult to use and hard to learn. VJ needed to find a way for the control system to be mounted in a pre-defined small space. They wanted plug and play convenience. And of course, they wanted it to be easy to use. Knowing there had to be a way, VJ started looking for an alternative, and found Simple Step.

Simple Step met those challenges. Simple Step provided VJ with an inexpensive board that not only fit perfectly into the small space, it also had an easy connect and disconnect for installing and repair. Simple Step's polarized locking connectors made the process fool proof. The controller offered another advantage: a high-resolution stepping mode that is repeatable. An additional benefit

THE CLIENT

VJ Electronix is an x-ray inspection, rework, and x-ray counting machine manufacturer in Bohemia, NY.

VJ ELECTRONIX™
Process Control Solutions
CONFIDENCE DELIVERED

THE PROBLEM

Even though their rework machine is large, it had a small, predefined space for a controller board. They needed a board that could be mounted inside their machine and hooked up.

Mounting problems

is the controller has capabilities for other operations, from opening & closing valves, to monitoring sensors, and switching on and off functions for lights and solenoids.

Now VJ can rely on a solid control system. Simple Step's motor control solves this company's tough challenges. The motion controller is always a perfect fit. What's more, it's easy to install and easy to use. Due to the size and inclusive nature of Simple Step's motion control board, VJ is able to rest assured their rework machine is exact and precise.

THE SOLUTION

The small and reliable motion control board from Simple Step fit in the small space available and was able to be mounted using pre-existing connections.

THE RESULTS

The new boards are reliable and allow them to easily fix issues and put the board back in again.

The motion controller from Simple Step was the perfect solution for this application with regard to size, cost and ease of use.

Bryan Pinette – Software Engineer, VJ Electronix.

We don’t have time to learn a new programming language

Diamond Engineering in Diamond Springs, CA designs and manufactures antenna measurement systems, RF power amplifiers, and custom measurement software.

Diamond Engineering found themselves in a race with other competitors. They wanted to have their antenna measurement system fully automated to compete in the marketplace. It was crucial that the system locate the best signal and hone in without the need of a human operator.

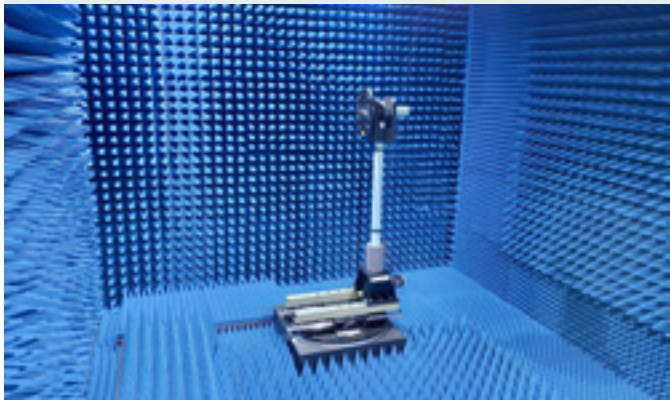
The company began a search to find a high-quality dependable precision motion control system that would give them the flexibility to program search patterns. Most importantly they needed a quick turnaround time from concept to production. Because time was of the essence, they didn’t want to be bogged down learning a new complex programming language.

Their search brought them to Simple Step. Charles gave Diamond a few simple tasks to determine the motor size, torque and speed for their system. The information helped them to decide on their present configuration. And, they were happy to hear the system would be inexpensive enough for them to put into production right away.

THE CLIENT

Diamond Engineering in Diamond Springs, CA has been creating antenna measurement systems, RF power amplifiers, and custom measurement software for over 25 years.

Diamond Engineering
Automated Measurement Systems



THE PROBLEM

They needed to get a new product to market quickly and didn’t have months to learn a complicated motion control language on top of everything else.

We don't have time to learn a new programming language

Once the boards arrived, they noticed the high quality of the controller. What came next was how simple the board was to use. The commands were easy to learn and with its many built in options they were able to customize their system's particular application. Within 3 weeks they were writing code!

As a result, Diamond was able to offer an all-inclusive control system that includes an antenna mechanism that allows for 360-degree movement and a resolution of 0.02 degrees in both the elevation and azimuth. This result is the foundation of their antennae measurement studio software. It also increased their market share.

THE SOLUTION
Simple Step's motion control language only needs 4 commands to get things moving without having to learn a whole new programming language.

THE RESULTS
Diamond Engineering was able to get their product ready for market and stay competitive.

Simple Step's clear text commands greatly shortened the development time to integrate their controllers across our entire product line. In addition, our customers now have the ability to easily control our equipment using custom programs for dedicated applications.

James Martin – President, Diamond Engineering Inc.

Hello? Anybody there?

Quantum Focus Instruments thrives on innovation. A spin-off from EDO/Barnes Engineering in 1997, QFI has maintained an innovative approach for microscopy systems for failure analysis and temperature measurement.

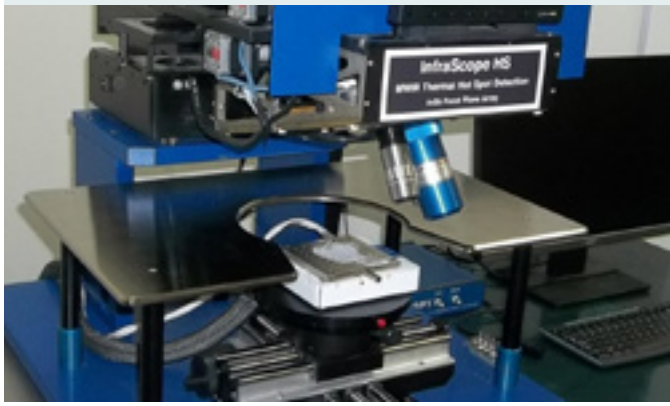
In 2005, they needed a highly-reliable motion controller that would allow them to move a microscope head incrementally in microns. While discussing their needs with colleagues, someone suggested that Quantum Focus take a look at Simple Step.

After all, if Simple Step could customize their motion controller for Lawrence Livermore National Lab, maybe they could design something for QFI. After talking with Charles about the applications, he determined that QFI didn't need a custom board, but could use an "Off the Shelf" controller. The new board helped achieve repeatability on a much finer scale, thanks to Simple Step's unique algorithm.

Since then, Quantum Focus discovered the versatility of the motion controller. They use Simple Step motion controllers in many of their machines. So, when they decided to build the Temperature Mapping Microscope

THE CLIENT

Quantum Focus Instruments Corporation is a Vista, CA company that designs and manufactures advanced failure analysis microscope systems and temperature measurement microscope systems for the semiconductor industry.



THE PROBLEM

They were waiting 24 to 72 hours for a response after placing a support request.

Hello? Anybody there?

to be used in the semiconductor industry, it was only natural that they would reach out to Simple Step to help them handle the complex hardware and software issues that come with new innovations.

They knew from past experience that when issues arise, solutions were found. Charles offered guidance and recommendations on many projects. He conceived of ways to troubleshoot and solve Quantum Focus's unique problems, by clarifying an unexplained circumstance, addressing a specific need, or suggesting workarounds. The support was not only responsive and timely, it was also personalized. The phone rang and it was picked up. An email sent; it was responded to. And Quantum Focus could rest assured that all boards are pretested before being shipped.

Collaboration is our support.

THE SOLUTION
With Simple Step, they received an answer in as little as 20 minutes.

THE RESULTS
They got the level of support they needed and eventually became more self-sufficient.

Simple Step Motion Controller is a key element in QFI's Infrascope System for maintaining precise control over the movement of the microscope head. The support from Simple Step allowed us to integrate the Simple Step controller into our system quickly. Their response time has always been excellent but once we got it up and running, the product works so well we rarely need to contact Simple Step for help."

Mike Villegas – Manufacturing Engineer, Quantum Focus Instruments Corporation

About Simple Step

With a motto like “Motion Control made Simple!®” you know Simple Step takes simplifying motion control seriously. Our motion control boards have been used in a wide variety of products around the world.

In addition to being easy to use, we have a sterling reputation for quality and service. With Simple Step, the boards that you put inside your product are always going to be 100% perfect when you get them. When you get a unit in, it’s been tested, it’s been checked, and it’s been serialized. All of that information has been put into a database in real-time by the testing system. If it fails, it never leaves the Simple Step facility. It’s that… simple.

When asked about the failure rate of Simple Step motion controller boards, president Charles Grenz replied they had a failure rate of .0000436. How did he come up with that number? “So far only 3 defective boards have come back in 22 years,” says Charles.

Simple Step has control systems in Germany that are still in use that were designed 18 years ago. One system has run 24/7 for all those years and has only been sent back once to replace the driver.

Simple Step is also keeping up-to-date with the latest industry developments and trends. For example, we recently redesigned our entire product line. Our original board design was piecemeal and each board progressed with additional features. Now we have a clean slate. All boards are now consistent with each other. They are plug and play with each other.

It doesn’t matter if you have a single or triple access, you can have 256 of these units in one serial control line, running at 460 K-baud with no problems. With the new control system, all connectors are polarized and locking; you can’t make a mistake now. “All of our customers are very excited about it,” says Charles.

If you’re struggling with any of the design problems covered in this white paper, Simple Step is here to help. For complete specs and software downloads to help with your next motion control system, visit www.simplestep.com.

Simple Step is a business founded in 1997 and incorporated in 1999. Based in New Jersey, the company has over 400 happy clients all over the world.

Simple Step®

Motion Control Made Simple!®

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